Measuring Perimeter and Area

Brief Overview:

Perimeter and area are components of measurement. Through the activities presented in this unit students will be involved in identifying the similarities and differences between perimeter and area. Students will be actively engaged in creating geometric shapes and measuring both the perimeter and area of their shapes.

NCTM Content Standard/National Science Education Standard:

1. **Understand measurable attributes of objects and the units, systems, and processes of measurement**
   - **Recognize the attributes of length, volume, weight, area, and time;**
   - **Understand how to measure using nonstandard and standard units;**
   - **Select an appropriate unit and tool for the attribute being measured.**
2. **Apply appropriate techniques, tools, and formulas to determine measurements**
   - **Measure with multiple copies of units of the same size;**
   - **Use tools to measure.**

Grade/Level:

Grades 1-2

Duration/Length:

3 days (60 minutes each day)

Student Outcomes:

Students will:

- **Develop the concept of perimeter by counting units around a picture or geometric shape.**
- **Develop the concept of area by counting square units within a picture or geometric shape.**
- **Tell the similarities and differences between perimeter and area.**

Materials and Resources:

Lesson 1

- **Index card for each student**
- **Overhead geoboard**
- **Geoboards for each student**
- **3-4 Rubber bands for each student**
- **Find the Perimeter transparency, Teacher Resource 1**
- **Geoboard dot paper, Student Resource 1**

Lesson 2

- **Area of our classroom transparency, Teacher Resource 2, drawn to match layout of classroom prior to lesson**
- **Overhead color tiles and/or connecting cubes**
- **Venn diagram of perimeter and area transparency, Teacher Resource 3**
- **Inch grid paper transparency and student copies, Student Resource 2**
- **20 Color tiles and/or connecting cubes per student**
- **Can you find my area?, Student Resource 3**
- **Area extension activity, Student Resource 4**

Lesson 3

- **What I know about perimeter and area, Student Resource 5**
- **Roles for group members, Teacher Resource 6, copied and cut prior to the lesson**
- **Perimeter verses area, Student Resource 6**
- **Chart paper**
- **Markers**
- **Inch grid paper, Student Resource 2**
- **20 Color tiles and/or connecting cubes per student**

Development/Procedures:

Lesson 1

Pre-Assessment

- **Tell students that they will be learning about perimeter and area over the next three days. Ask: *"Does anyone know what perimeter and area are?"* Elicit answers from the students. Ask: *"Does anyone know how to find the perimeter of a shape?"* Elicit answers from the students. Ask: *"Does anyone know how to find the area of a shape?"* Elicit answers from the students.**
- **Inform the students that we will be focusing on developing the concept of perimeter today.**
- **Display transparency of Find the Perimeter, Teacher Resource 1, on the overhead. *This same Teacher Resource will be used again during Student Application.***
- **Ask students how they think they would determine the perimeter of the shape.**
- **Lead students towards realizing that the perimeter measures the outside of a geometric shape or picture.**

Launch

- **Inform the students that you need their help measuring the perimeter of their desks. Distribute an index card to each student.**
- **Ask each student to stand and walk around their desk counting the number of steps that they take to measure the perimeter. Tell each student to write the perimeter of their desk on the provided index card.**
- **Invite the students to bring their index cards and sit on an open area of the floor.**

Teacher Facilitation

- **Share the different measurements that were found and ask: *"Why do you think we found different measurements for the***

perimeter of our desks?" **Elicit student responses. Possible answers might be: we have different size feet; we walk at different paces; we walk with different size steps.**

- **Lead students to understand that they need a standardized unit of measurement such as inches or centimeters when measuring the perimeter of a geometric shape or picture.**

Student Application

- **Display Find the Perimeter, Teacher Resource 1, on the overhead again. Review how to find the perimeter of a geometric shape and ask a student volunteer to tell what the perimeter of the shape is.**
- **Inform the students that they will be using geoboards to create various shapes with a given perimeter of 10 units.**
- **Model how to make a different geometric shape on an overhead geoboard, using the same perimeter of the geometric shape on Find the Perimeter, Teacher Resource 1. Model how to transfer the shape on the geoboard to geoboard dot paper, Student Resource 1.**
- **Distribute a geoboard, 3-4 rubber bands, and a copy of Student Resource 1 to each student.**
- **Tell students to create 3 or 4 different geometric shapes with a perimeter of 10 units using their geoboard and rubber bands. Have each student record their geometric shapes on Student Resource 1. Allow approximately 20 minutes for this activity.**
- **Circulate and observe students. Note the students having difficulty creating different geometric shapes with the same perimeter.**

Embedded Assessment

- **Teacher observation of students as they complete Student Resource 1.**
- **Tell each student to draw any geometric shape in an empty space on Student Resource 1 and label the perimeter. Collect students' worksheets to check for understanding.**

Reteaching/Extension

- **For those who have not completely understood the lesson, teacher or assistant may choose to work with them in a small group as they create basic geometric shapes, such as squares and rectangles, and determine their perimeter.**
- **For those who have understood the lesson, ask them to create an additional three shapes with the same perimeter on Student Resource 1.**

Lesson 2

Pre-Assessment

- **Ask a student volunteer to explain what the word perimeter means and how to measure perimeter based on the previous lesson.**
- **Have other student volunteers provide examples of times when people would need to determine the perimeter of a geometric shape or picture.**
- **Inquire if any of the students know what area means and how to measure the area of a geometric shape or picture. Lead students to understand that while the perimeter measures the outside of a geometric shape or picture, the area measures the space inside the geometric shape or picture in square units.**

Launch

- **Ask: *"If we wanted to put a new tile floor in our classroom, how could we find out how many tiles we would need to buy?"* Elicit answers from the students.**
- **Ask: *"How would we measure the space that we would need to cover?"* Elicit answers from the students. A possible response would be to measure the length and width of the room.**
- **Ask: *"What would happen if we did not buy enough tiles?"* Elicit answers from the students. A possible response would**

- **Ask: *"What would happen if we bought too many tiles?"* Elicit answers from the students. Possible responses would be we could save the extra tiles in case any of the tiles need to be repaired; we could return the extra tiles.**
- **Model how to measure the area of a floor by placing one color tile or connecting cube per square unit for each square foot of the classroom on a transparency of Teacher Resource 2.**

Teacher Facilitation

- **Lead students in a discussion of the similarities and differences between perimeter and area.**
- **Record student responses on Venn Diagram of Perimeter and Area, Teacher Resource 3. Possible responses would be both perimeter and area are forms of measurement; perimeter measures the outside of a geometric shape or picture; area measures the number of square units inside a geometric shape or picture; perimeter is measured in inches or centimeters; area is always measured in square units.**

Student Application

- **Distribute Student Resource 2 and 20 color tiles or connecting cubes to each student.**
- **Ask students to create a rectangular shape that has an area of 12 square units. Ask student volunteers to share some of the different ways they created their shape by placing their color tiles or connecting cubes on a transparency of Student Resource 2. Possible solutions are 2 x 6; 3 x 4; 4 x 3; 6 x 2; 1 x 12; 12 x 1.**
- **As a class, count the total number of color tiles or connecting cubes to verify the area of each rectangle in square units. By counting the total number of tiles or cubes for each shape, it will assist the students in coming to the**

realization that different rectangular shapes can have the same area.

- **Repeat the process with students by asking them to create a rectangular shape with an area of 16 square units. Possible solutions are 2 x 8; 4 x 4; 8 x 2; 16 x 1; 1 x 16.**
- **Inform students they will be creating their own rectangular shape with an area of their choice. Tell students they will be switching shapes with a partner. Their partners will then find the area of the new shapes. Discuss strategies to use to find the area of these shapes.**
- **Circulate and observe students while they are completing this activity.**
- **Distribute Student Resource 3 for students to complete independently.**

Embedded Assessment

- **Teacher observation of students as they complete activities and Student Resource 3.**
- **Collect students' work on Student Resource 3 to check for understanding of how to find the area of various rectangles. Answers can be found on Teacher Resource 4.**

Reteaching/Extension

- **For those who have not completely understood the lesson, teacher or assistant may choose to work with them in a small group as they create a 2 x 3 rectangular shape and count aloud the total number of square units inside the shape.**
- **For those who have understood the lesson, have students find the area of a square and trapezoid on Area Extension Activity, Student Resource 4. Remind students when working on determining the area of a trapezoid, they must count the whole square units first and then add the half units together before figuring out the total number of square units. Answer key can be found on Teacher Resource 5.**

Lesson 3

Pre-assessment

- **Inform the students that you want to see how much they can tell you about perimeter and area.**
- **Distribute What I know about Perimeter and Area!, Student Resource 5 to each student and allow students approximately 5 minutes to fill in the sheet.**
- **Ask various student volunteers to share their responses to determine understanding of the concepts of perimeter and area.**

Launch

- **Tell students that they will be working in small groups to list scenarios or situations in which they would need to use perimeter and when they would need to use area.**
- **Divide the students into groups of four.**
- **Pre-cut roles for each group member, Teacher Resource 6. Assign each student in the groups a role.**
- **Distribute Perimeter versus Area, Student Resource 6, to each group and ask each group to list scenarios or situations in which they would need to use perimeter or area. Possible answers for perimeter are: measuring a fence; measuring the wooden edging around a playground; measuring wallpaper/border; measuring a deck rail; measuring chair rail. Possible answers for area are: measuring carpet; measuring a tile floor or wall; measuring paint needed for a room.**
- **Allow groups approximately 5-10 minutes to complete Student Resource 6 in their groups.**

Teacher Facilitation

- **Invite the groups to bring Student Resource 6 and sit on an open area of the floor.**

- **Record responses shared by each spokesperson on an identical chart written on chart paper.**

Student Application

- **Inform students that they will be creating a geometric shape of their choice for a partner to measure the perimeter and area.**
- **Distribute Student Resource 2 and color tiles or connecting cubes to each student.**
- **Ask each student to create a geometric shape of their choice on Student Resource 2 using the provided color tiles or connecting cubes. Tell students to trace the outer edges of the shape they have made using a pencil or crayon.**
- **Ask students to switch Student Resource 2 with a partner and have the partner determine the perimeter and area of the created shaped. Tell students to record the perimeter and area of the shape on the paper. They should trade papers back with the original partner and check their work.**
- **Circulate and observe students. Note students that are still having difficulty with measuring perimeter and area.**

Embedded Assessment

- **Teacher observation of students during pre-assessment, launch and student application activities.**

Reteaching/Extension

- **For those who have not completely understood the lesson, teacher or assistant may choose to work with them in a small group as they create basic geometric shapes and determine both the perimeter and area.**
- **For those who have understood the lesson, allow them to use the computer to work on the website: http://nlvm.usu.edu/en/nav/frames_asid_125_g_1_t_4.html?open=activities that provides additional practice with**

creating geometric shapes on a geoboard and measuring the perimeter and area.

Summative Assessment:

- **Students will complete the assessment activity on Student Resource 7. The answer key may be found on Teacher Resource 7.**

Appendix A: Student Resources

- **Geoboard Dot Paper, Student Resource 1**
- **Inch Grid, Student Resource 2**
- **Can You Find My Area?, Student Resource 3**
- **Area Extension Activity, Student Resource 4**
- **What I know about PERIMETER and AREA!, Student Resource 5**
- **Perimeter versus Area, Student Resource 6**
- **Summative Assessment, Student Resource 7**

Appendix B: Teacher Resources

- **Find the Perimeter, Teacher Resource 1**
- **Area of Our Classroom, Teacher Resource 2**
- **Venn Diagram, Teacher Resource 3**
- **Can You Find My Area? key, Teacher Resource 4**
- **Area Extension Activity key, Teacher Resource 5**
- **Roles for Each Group Member, Teacher Resource 6**
- **Summative Assessment key, Teacher Resource 7**

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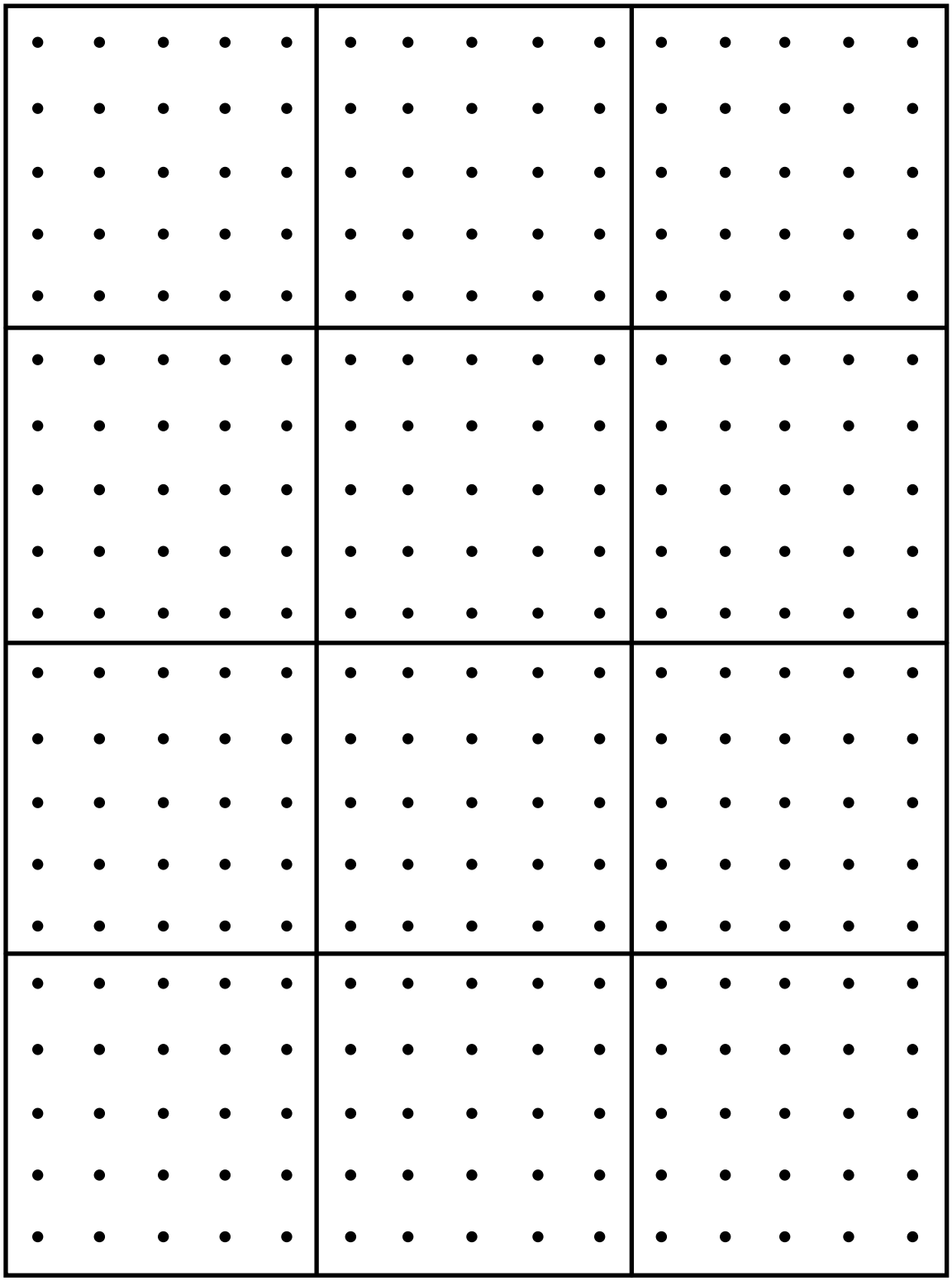
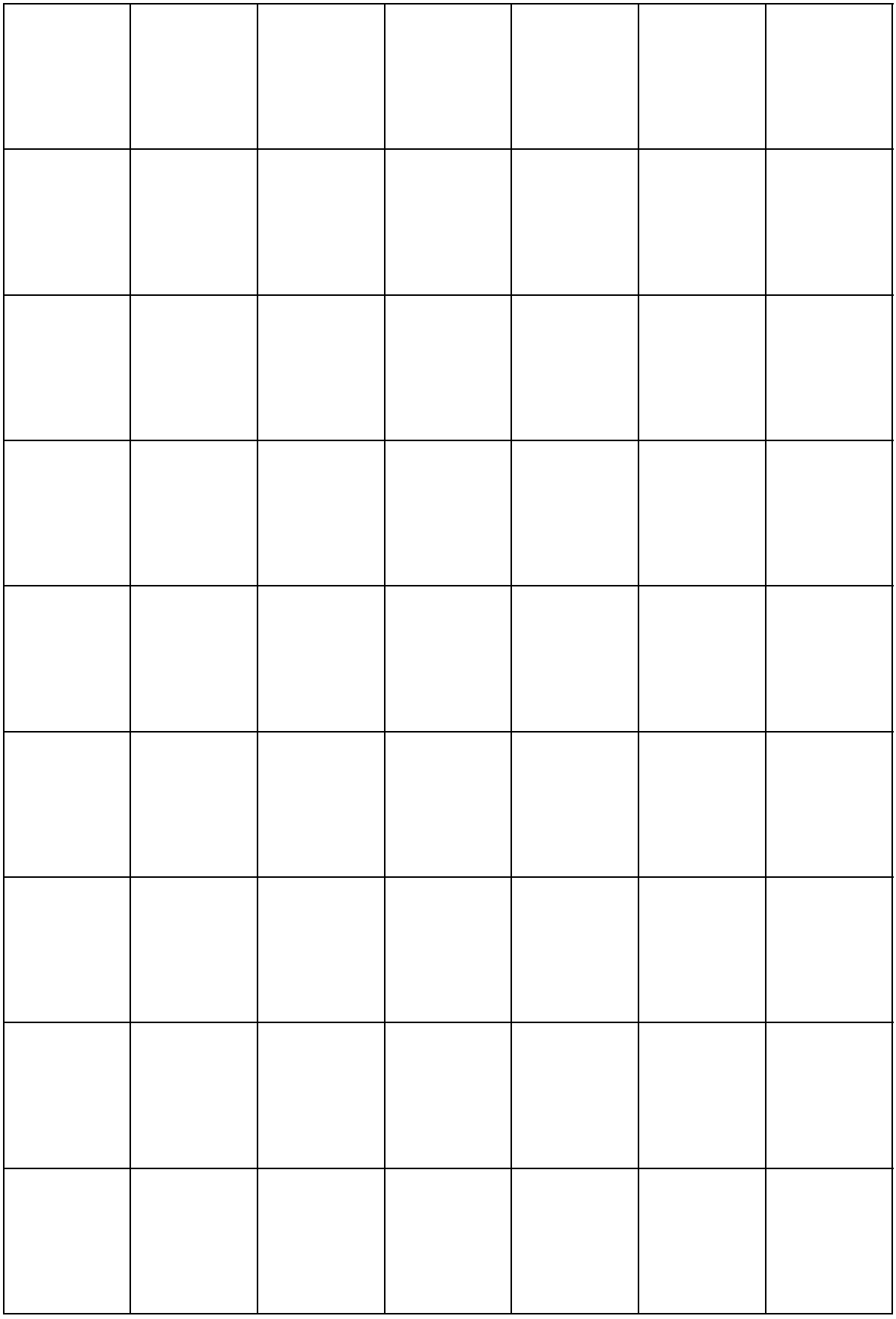
Geoboard Dot Paper

Name: ……..

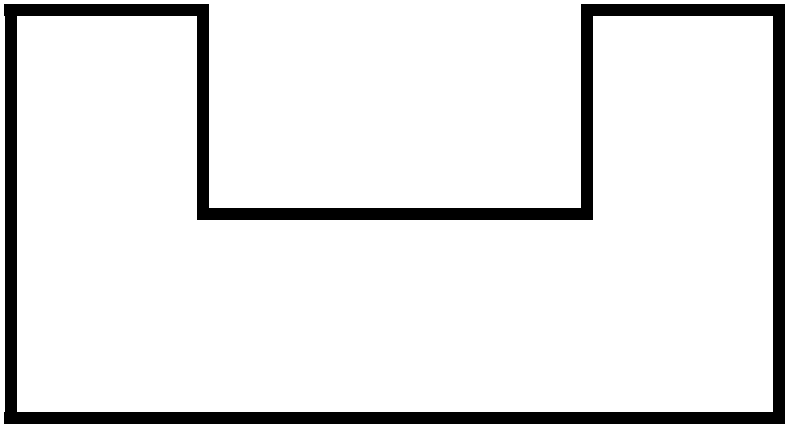


Inch Grid



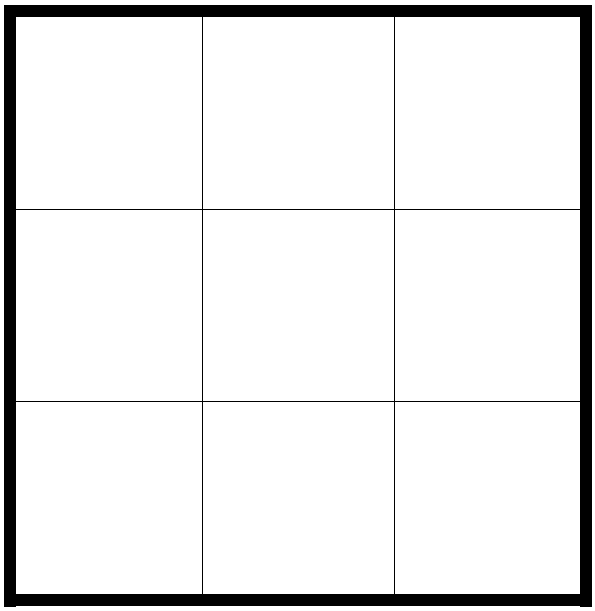
Can You Find My Area?

Area=___ square units

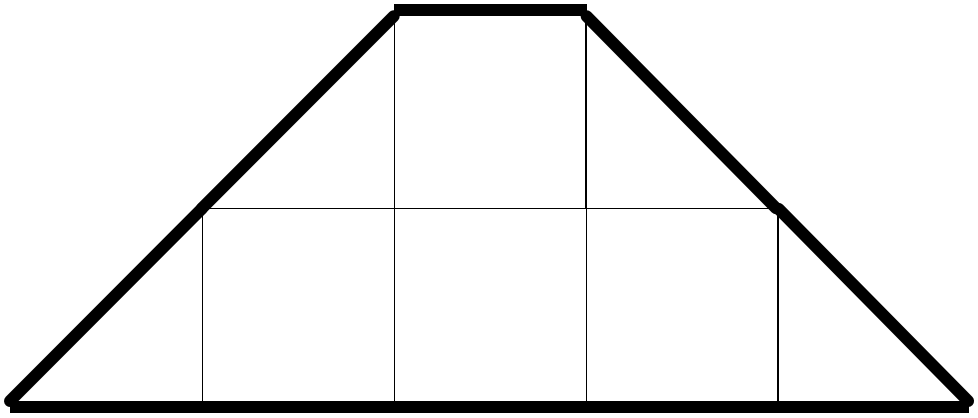


Area=___ square units

Area Extension Activity



Area=__square units



Area=__square units

What I know about PERIMETER and AREA!

I know perimeter is....

_____

_____

_____

_____

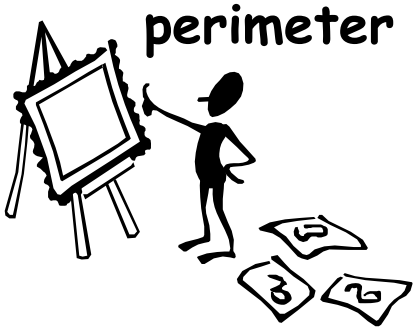
One question I have about area is...

_____

_____

_____

Here's a picture to show what I know about perimeter and area



Perimeter versus Area

Perimeter	Area

_____/ 10

Name _____ Date _____

Summative Assessment – Measuring Perimeter and Area

1. **The perimeter of a geometric shape measures the _____.**

   O top of the shape.
   O inside of the shape.
   O outside of the shape.
   O bottom of the shape.

2. **The perimeter of a geometric shape can be measured in _____.**

   O inches.
   O boxes.
   O cups.
   O gallons.

3. **The area of a geometric shape measures the _____.**

   O outside of the shape.
   O inside of the shape.
   O center of the shape.
   O bottom of the shape.

4. **The area of a geometric shape is always measured in _____.**

   O inches.
   O degrees.
   O centimeters.
   O square units.

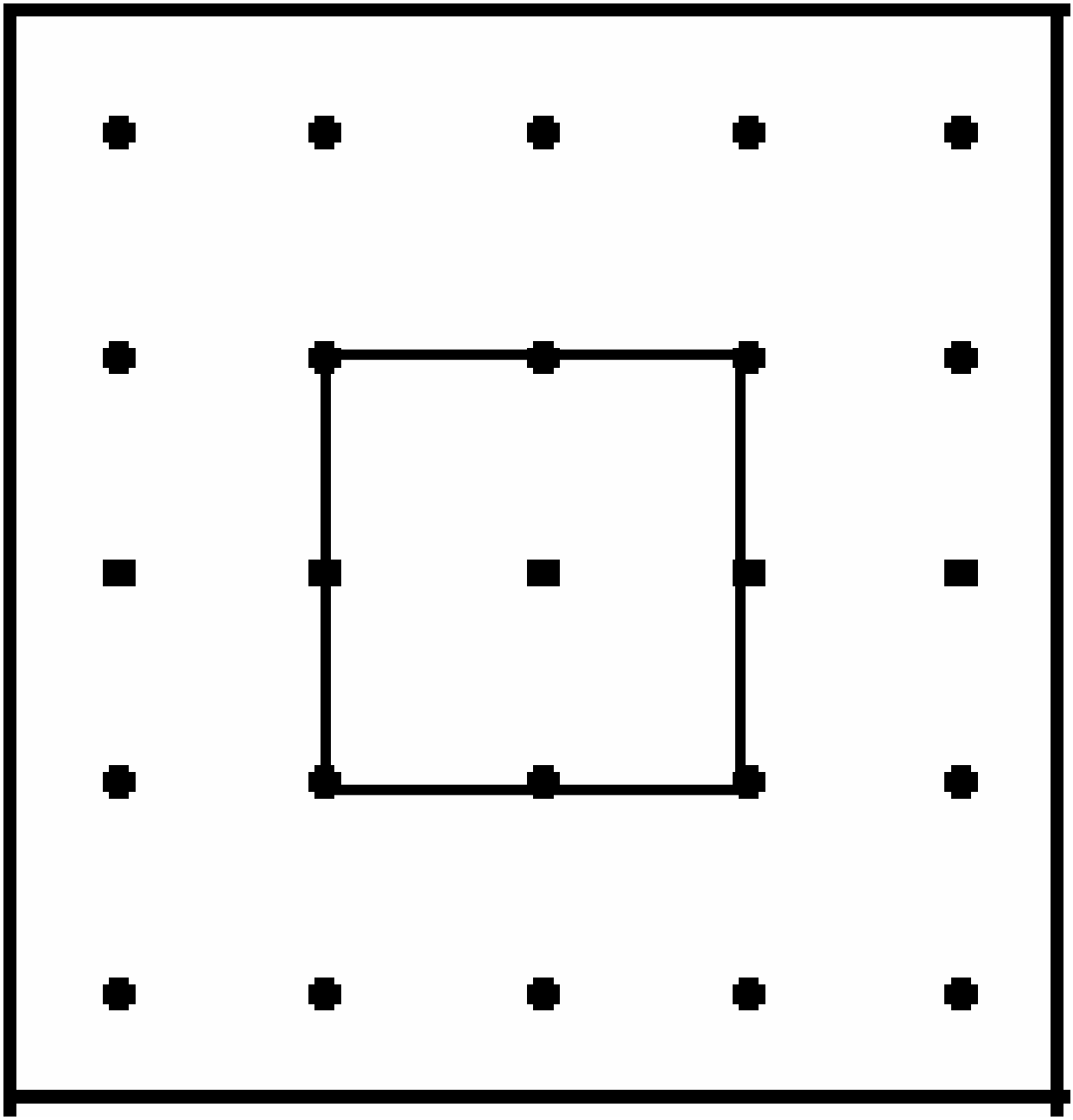
5. **Perimeter and area are used to measure _____.**

   O geometric shapes.
   O time.
   O length.
   O weight.

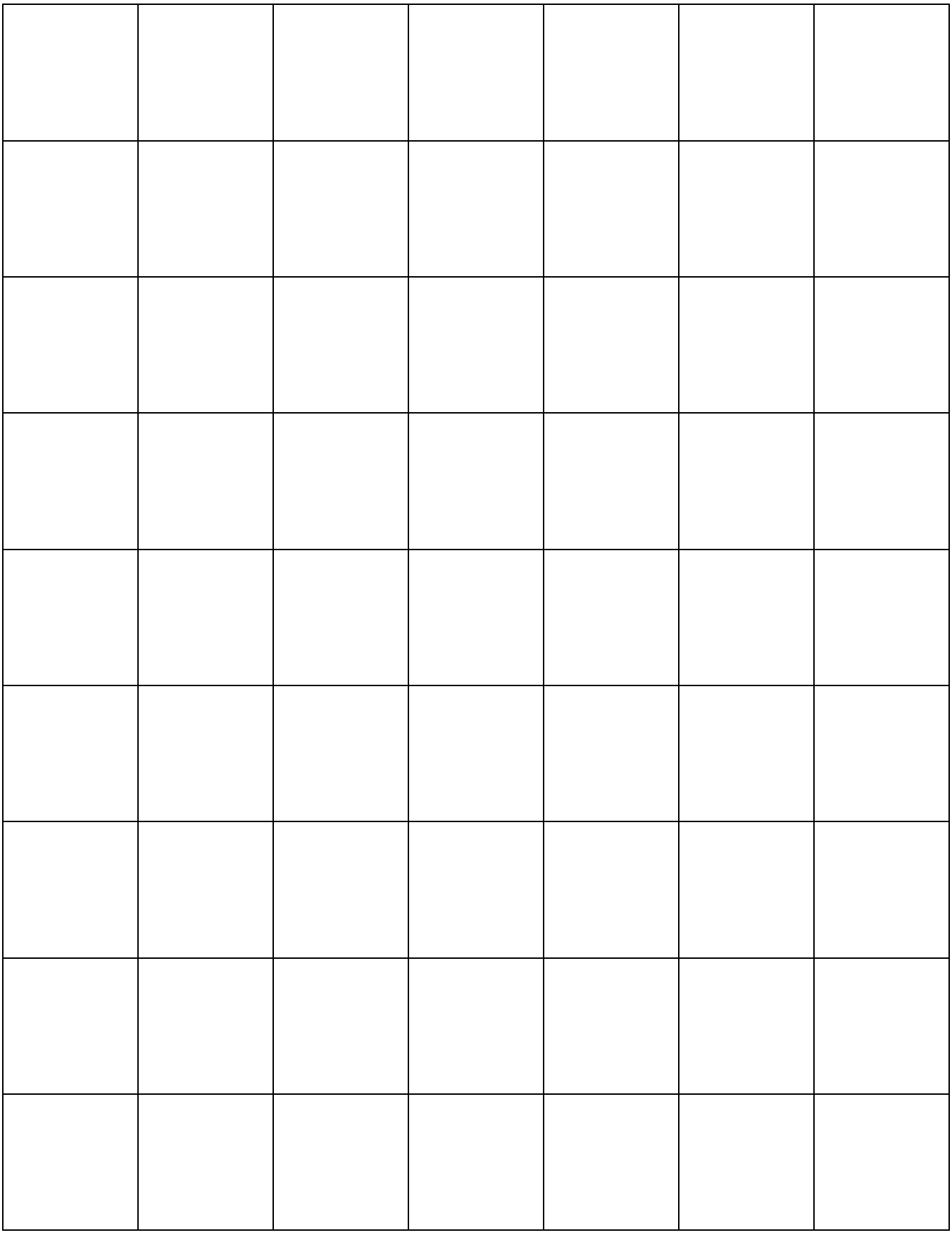
6. **Different shapes can have the same total area.**

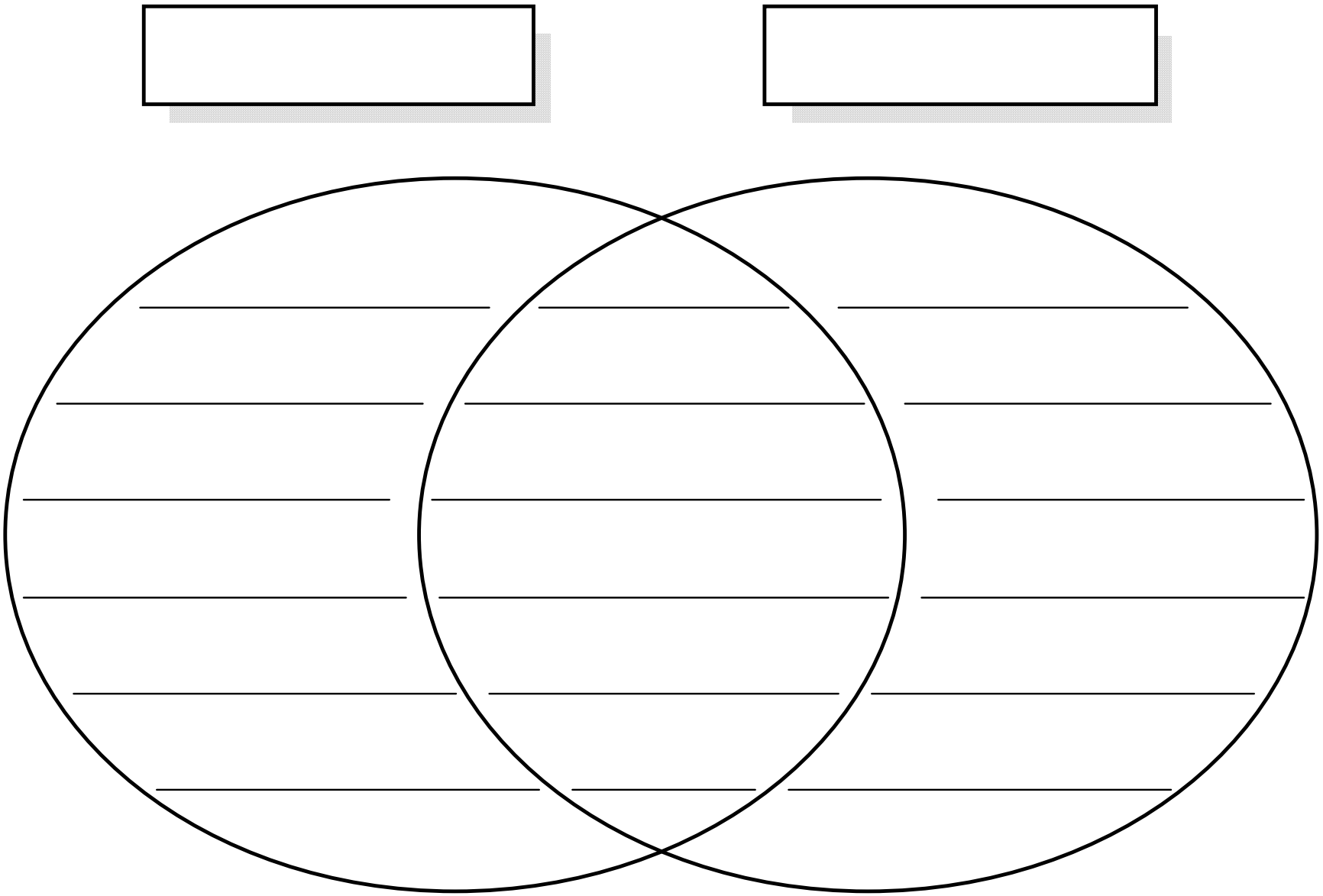
   O True
   O False

Find the Perimeter



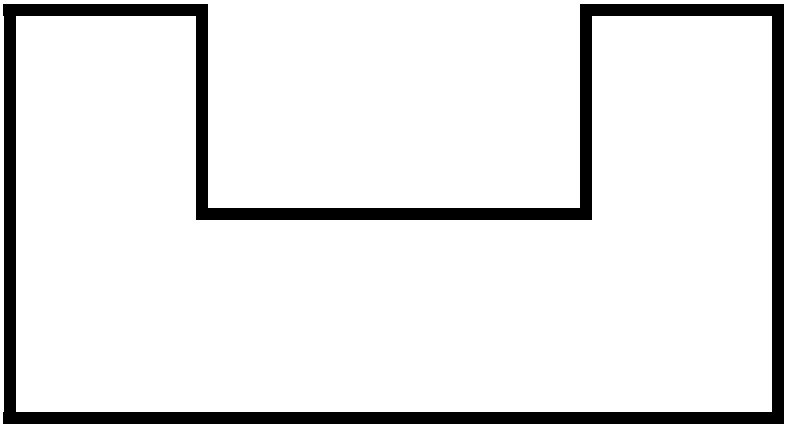
Area of Our Classroom





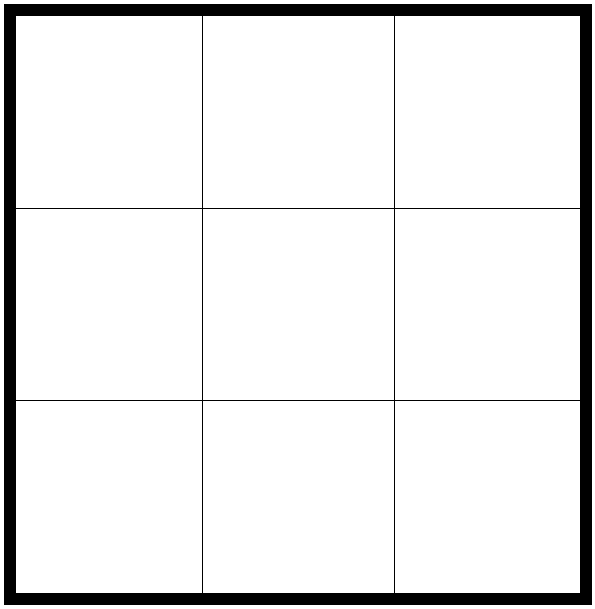
Can You Find My Area?

Area=__8_square units

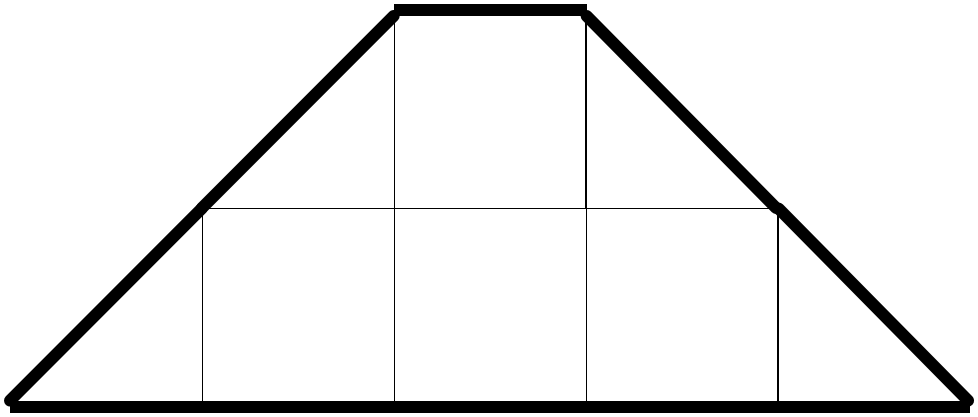


Area=_6_ square units

Area Extension Activity



Area=_9_square units



Area=_6_square units

Roles for Each Group Member

 **Taskmaster:** **collects the materials**	 **Recorder:** **writes the responses**
 **Facilitator:** **makes sure the group is working cooperatively**	 **Spokesperson:** **presents the materials to the class**

_____/ 10

Name _____ Date _____

Summative Assessment – Measuring Perimeter and Area

1. **The perimeter of a geometric shape measures the _____.**

   O top of the shape.
   O inside of the shape.
   O outside of the shape. **1 point**
   O bottom of the shape.

2. **The perimeter of a geometric shape can be measured in _____.**

   O inches. **1 point**
   O boxes.
   O cups.
   O gallons.

3. **The area of a geometric shape measures the _____.**

   O outside of the shape.
   O inside of the shape. **1 point**
   O center of the shape.
   O bottom of the shape.

4. **The area of a geometric shape is always measured in _____.**

   O inches.
   O degrees.
   O centimeters.
   O square units. **1 point**

5. **Perimeter and area are used to measure _____.**

   O geometric shapes. **1 point**
   O time.
   O length.
   O weight.

6. **Different shapes can have the same total area.**

   O True **1 point**
   O False